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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,359	06/09/2006	Hajime Kando	36856.1450	5636

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MURATA MANUFACTURING COMPANY, LTD.
C/O KEATING & BENNETT, LLP
8180 GREENSBORO DRIVE
SUITE 850
MCLEAN, VA 22102

EXAMINER	
ROSENAU, DEREK JOHN	

ART UNIT	PAPER NUMBER
2834	

NOTIFICATION DATE	DELIVERY MODE
01/28/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JKEATING@KBIPLAW.COM
uspto@kbiplaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/596,359	KANDO, HAJIME	
	Examiner	Art Unit	
	Derek J. Rosenau	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/9/06 5/3/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: VM, K2, TCFM, A, B, C, D, E, F, PMAM, 43, and 44. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 22-28, 31, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura (US 2002/0158549) in view of Taniguchi (US 2001/0008387).

5. With respect to claim 22, Itakura et al. discloses a boundary acoustic wave device (Fig 1) using a non-leaky propagation type boundary acoustic wave, comprising: a boundary acoustic wave element, including a single crystal substrate (item 4), a solid layer (item 6) provided on the single crystal substrate, and electrodes (item 5) arranged at a boundary between the single crystal substrate and the solid layer (Fig 1); wherein the single crystal substrate has a cut angle (Paragraph 86).

Itakura et al. does not disclose expressly a plurality of boundary acoustic wave elements, the single crystal substrates of those elements having the same cut angle, or a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave resonators.

Taniguchi teaches a boundary acoustic wave device having a plurality of boundary acoustic wave elements (Fig 5), the single crystal substrates of those elements having the same cut angle (Paragraph 49), and a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave resonators (Fig 5).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the plurality of boundary acoustic wave elements having different propagation directions with the boundary acoustic wave device of Itakura et al. for the benefit of allowing for different electromechanical coupling coefficients within the same device (Paragraph 58 of Taniguchi).

6. With respect to claim 23, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that the plurality of boundary acoustic wave elements are boundary acoustic wave filters or boundary acoustic wave resonators (Paragraph 58).

7. With respect to claim 24, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that the plurality of boundary acoustic wave elements define resonators (Paragraph 58).

8. With respect to claim 25, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that the boundary acoustic wave device is a longitudinally coupled filter (Fig 5).

9. With respect to claim 26, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that the boundary acoustic wave elements are provided on a single piezoelectric single crystal substrate (Paragraph 58).

10. With respect to claim 27, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that an electromechanical coefficient of at least one of the boundary acoustic wave

elements is different from that of at least one of the other boundary acoustic wave elements (Paragraph 58).

11. With respect to claim 28, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that a band width of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave elements (Paragraph 55).

12. With respect to claim 31, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that $H>8261.744\rho^{-1.376}$, when ρ represents the density of the electrodes, H represents the thickness of the electrodes, and λ represents the wavelength of a boundary wave. The claim language does not define the wavelength or how to determine it; therefore, the wavelength can be any desired value. Therefore, the electrode thickness would meet the condition $H>8261.744\rho^{-1.376}$ for some value of λ.

13. With respect to claim 33, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that $33000.39050\rho^{-1.50232}<H<88818\rho^{-1.54998}$. The claim language does not define the wavelength or how to determine it; therefore, the wavelength can be any desired value. Therefore, the electrode thickness would meet the condition $33000.39050\rho^{-1.50232}<H<88818\rho^{-1.54998}$ for some value of λ.

14. With respect to claim 35, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22. Taniguchi discloses that the electrodes each include a main electrode layer made from a material selected

from the group consisting of Au, Ag, Cu, Al, Fe, Ni, W, Ta, Pt, Mo, Cr, Ti, ZnO, and ITO (Paragraph 61).

15. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura in view of Taniguchi and Takayama et al. (US 20040174233).

16. With respect to claim 29, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22.

Neither Itakura nor Taniguchi discloses expressly that thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate.

Takayama et al. teaches a boundary acoustic wave device in which the thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate (Paragraphs 8 and 83). Although Takayama et al. does not disclose explicitly the functional language "so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate," this would be inherent as Takayama et al. discloses the electrode thicknesses disclosed in the specification.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the electrode thickness of Takayama et al. with the boundary acoustic wave device of Itakura as modified by Taniguchi for the benefit of reducing the propagation loss (Paragraph 8 of Takayama et al.).

17. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura in view of Taniguchi and Takamine (US 20020135267).

18. With respect to claim 30, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22.

Neither Itakura nor Taniguchi discloses expressly that a duty ratio of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate.

Takamine teaches a boundary acoustic wave device in which a duty ratio of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate (Paragraph 64 and Table 1). Although Takayama et al. does not disclose explicitly the functional language "so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate," this

would be inherent as Takayama et al. discloses the IDT duty ratios disclosed in the specification.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the IDT duty ratio of Takamine with the boundary acoustic wave device of Itakura as modified by Taniguchi as it has been held that optimization of a device, where the general conditions are met by the prior art, would be obvious to a person of ordinary skill in the art (*In re Aller*, 105 USPQ 233).

19. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi and Nakahata (US 6025636).

20. With respect to claim 34, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22.

Neither Itakura et al. nor Taniguchi discloses that the piezoelectric single crystal substrate is $LiNbO_3$ substrate, φ of Euler angles (φ,θ,ψ) of the $LiNbO_3$ substrate is in the range -31° to 31°, and θ and ψ are in the range surrounded by the points A1 to A13 shown in table 1

Points	Ψ(°)	Θ(°)
A01	0	116
A02	11	118
A03	20	123
A04	25	127
A05	33	140

A06	60	140
A07	65	132
A08	54	112
A09	48	90
A10	43	87
A11	24	90
A12	0	91
A13	0	118

Nakahata teaches a boundary acoustic wave device in which the piezoelectric single crystal substrate is $LiNbO_3$ substrate, φ of Euler angles (φ,θ,ψ) of the $LiNbO_3$ substrate is in the range -31° to 31°, and θ and ψ are in the range surrounded by the points A1 to A13 (column 9, line 65 through column 10, line 18).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the crystal orientation of Nakahata with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi for the benefit of an acoustic velocity of 8000 m/s or higher (column 10, lines 34-42).

21. Claims 32, 36-38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi and Nishiyama et al. (US 2007/0132339).

22. With respect to claim 32, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22.

Neither Itakura et al. nor Taniguchi et al. disclose that $\rho>3745$ kg/m^3.

Nishiyama teaches a boundary acoustic wave device in which the electrode may be made of a large number of materials, among them materials having densities greater than 3745 Kg/m^3 (Paragraph 32).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the electrode materials of Nishiyama et al. with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi as the electrode materials taught by Nishiyama are well known for their use as electrode materials.

23. With respect to claim 36, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 35.

Neither Itakura et al. nor Taniguchi discloses that the electrodes each further include an additional electrode layer laminated on the main electrode layer.

Nishiyama et al. teaches a boundary acoustic wave device in which the electrodes each include an additional electrode layer (Fig 1F and 1G, item 5) laminated on the main electrode layer (item 4A).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the additional electrode of Nishiyama et al. with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi for the benefit of providing a protective film for the main electrode (Paragraph 160 of Nishiyama et al.).

24. With respect to claim 37, the combination of Itakura et al., Taniguchi, and Nishiyama et al. discloses the boundary acoustic wave device according to claim 36. Itakura discloses that the solid layer includes a dielectric substance (Paragraph 97).

25. With respect to claim 38, the combination of Itakura et al., Taniguchi, and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37. Itakura et al. discloses that the dielectric substance includes a material primarily composed of SiO_2 (Paragraph 97).

26. With respect to claim 41, the combination of Itakura et al., Taniguchi, and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37. Itakura et al. discloses that the solid layer includes at least one material selected from the group consisting of Si, SiO_2, glass, silicon nitride, silicon carbide, ZnO, Ta_2O_5, titanate zirconate lead piezoelectric ceramic, aluminum nitride, Al_2O_3, $LiTaO_3$, and $LiNbO_3$ (Paragraph 97).

27. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Nishiyama, and Mishima et al. (US 20050099091).

28. With respect to claim 39, the combination of Itakura et al., Taniguchi, and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37.

None of Itakura et al., Taniguchi, or Nishiyama et al. discloses that the solid layer includes a plurality of laminates, each of the plurality of laminates including a plurality of material layers.

Mishima et al. teaches a boundary acoustic wave device in which the solid layer includes a plurality of laminates, each of the plurality of laminates including a plurality of material layers (Fig 10, items 15 and 16).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the laminates solid layer of Mishima et al. with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi and Nishiyama et al. for the benefit of preventing thermal damage during the manufacturing process (Paragraph 72 of Mishima et al.).

29. With respect to claim 40, the combination of Itakura et al., Taniguchi, Nishiyama et al., and Mishima et al. discloses the boundary acoustic wave device according to claim 39. Mishima et al. discloses that the solid layer includes a layer primarily composed of SiO_2 (item 15) laminated to a layer primarily composed of Si (item 16).

30. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi and Kadota et al. (US 5260913).

31. With respect to claim 42, the combination of Itakura et al. and Taniguchi discloses the boundary acoustic wave device according to claim 22.

Neither Itakura et al. nor Taniguchi discloses expressly that the boundary acoustic wave elements each further includes a resin layer adhered to the solid layer.

Kadota et al. teaches a boundary acoustic wave device in which the boundary acoustic wave elements includes a resin layer (Fig 9, item 29) adhered to a solid layer (item 5).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the resin layer of Kadota et al. with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi for the benefit of simplifying the

manufacturing process of the device (column 6, lines 59-68 of Kadota et al.) and better protecting the device by placing the device in a packaging material.

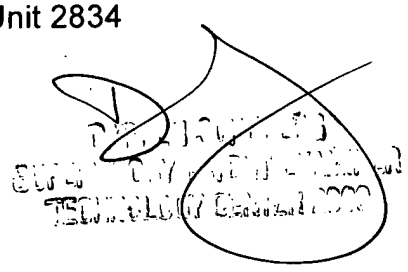
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau
Examiner
Art Unit 2834



DJR
1/16/2008